

WHAT IS CLAIMED IS:

1. A method, comprising:
exposing a photo-sensitive medium to an optical intensity pattern while the
medium is maintained in a condition that inhibits or prevents the optical intensity pattern
5 from producing refractive index changes in the medium; and
then, heating the exposed medium to stimulate a pattern of refractive index
changes that is responsive to the optical intensity pattern during the exposing.

2. The method of claim 1, wherein the condition includes that a temperature
10 of the medium is lower than a temperature of the medium during the heating.

3. The method of claim 1, further comprising:
exposing one or more points or lines in the medium with light that causes photo-
chemical reactions in the medium via multiple-photon absorption events.
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4. The method of claim 1, wherein the heating produces the pattern of
refractive index changes by causing a chemical reaction selected from the group
consisting of polymerization of oligomers, stimulating deprotection of portions of
polymers, and stimulating crosslinking of polymers.
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5. The method of claim 1, wherein the medium includes a concentration of
molecules that are able to neutralize photo-chemical reaction products produced by the
exposing, the products being able to stimulate the chemical reaction the produces the
pattern of refractive index changes.
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6. The method of claim 1, wherein the optical intensity pattern is produced
by interfering at least three mutually coherent light beams.

7. The method of claim 6, wherein the pattern of refractive index changes
30 tracks the optical intensity pattern.

5 9. The method of claim 6, wherein the heating includes heating the medium
to a temperature of a rubber-like phase.

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by light of a wavelength, products of the photo-chemical reactions being able to stimulate refractive index changes in the medium; and

exposing the medium to an optical interference pattern that is produced by combining a plurality of mutually coherent beams of light of the wavelength, the

5 exposing being done at a temperature that inhibits or prevents the products of the photo-chemical reactions from causing the refractive index changes.

15. The method of claim 14, wherein the providing a medium includes providing a medium with a concentration of molecules to neutralize a portion of the
10 products, the neutralized portion of the products being unable to cause refractive index changes in the medium.

16. The method of claim 14, further comprising:
heating the exposed medium to stimulate the products to cause refractive index
15 changes in the medium.

17. The method of claim 16, wherein the photo-sensitizer molecules are visible dye molecules and the products cause polymerization, deprotection, or crosslinking reactions in the medium in response to the heating.
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18. The method of claim 16, wherein the heating produces an interconnected open polymerized structure.